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(54) Composite Spring

(57) A composite spring comprises a coil spring 2 coaxially enclosing a deformable core 3 of felt or resilient plastics foam. At least some of the coils of the spring 2 are in contact with the periphery of the core and deform the surface of the core, this deformation increasing as the spring deforms under axial loading, so that the core effectively reinforces and supports the spring 2 while supplementing the resilient action of the spring. Instead of the shape shown, the coil spring may be cylindrical or barrel shaped.

The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

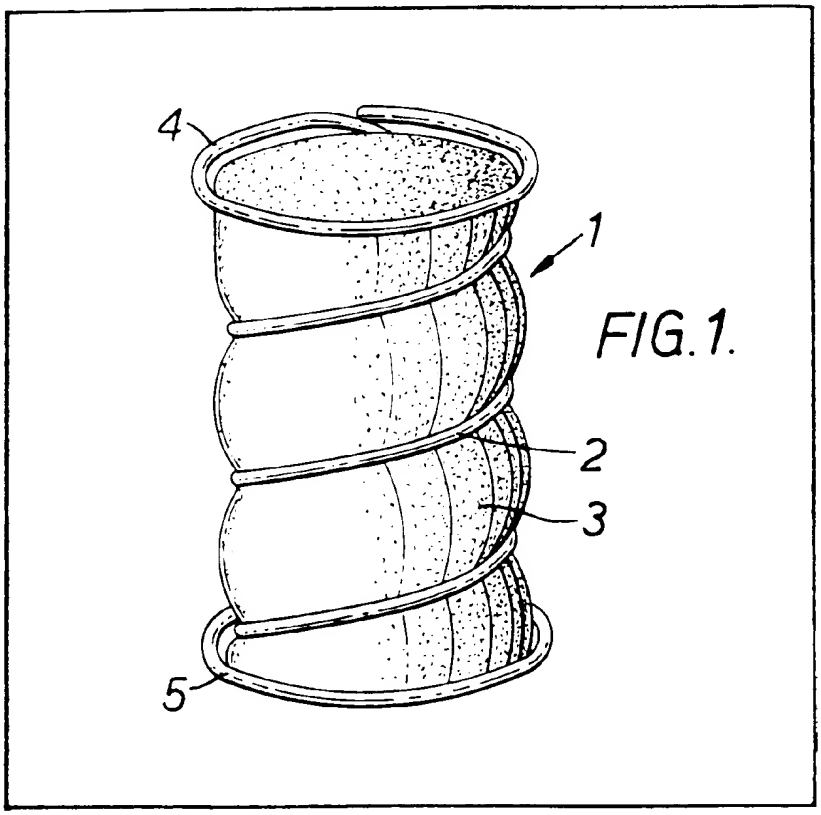

FIG.1.

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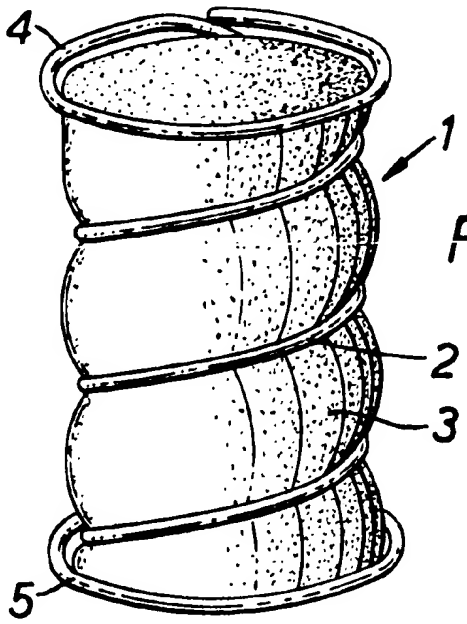


FIG.1.

FIG.2.

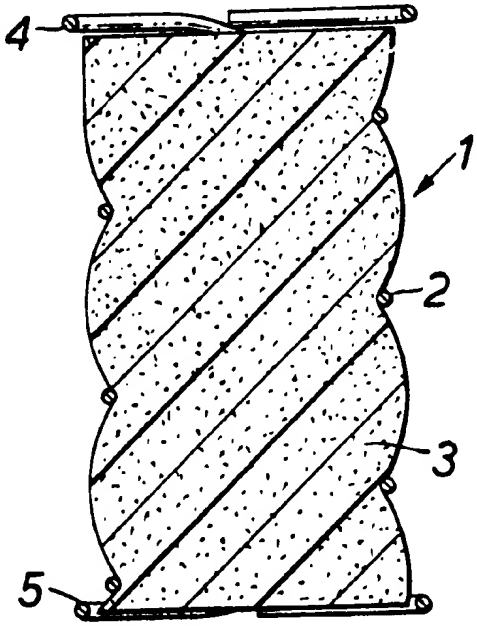
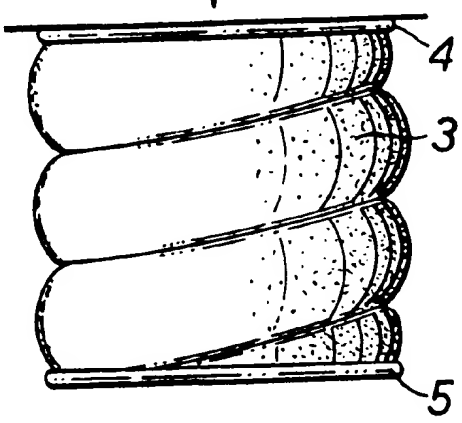


FIG.3.



SPECIFICATION

Composite Spring

This invention relates to composite springs, and is particularly but not exclusively applicable to composite springs as employed in the construction of spring interior mattresses, divans and bed bases.

It is known to provide spring-interior mattresses with metal coil springs enclosed in cavities in a foam mattress, or to enclose the springs in individual "pockets" to prevent interference between adjacent springs when the springs are collapsed.

It is also known in the construction of mattresses, divans and bed bases to provide "harder" springing near the outer edges than in the centre, to increase the resistance to collapse in the edge regions of the mattress or bed.

The present invention provides a simple and effective composite spring which has been found to offer practical advantages compared with simple coil springs.

According to the present invention there is provided a composite spring comprising a coil spring coaxially enclosing a deformable core, at least some of the coils of the spring being in contact with the periphery of the core and deforming the surface of the core.

The deformable core may comprise deformable material such as felt, but in preferred embodiments of the invention a resiliently deformable core is used consisting of, for example, resilient foam material. Conveniently, resilient plastics foam such as polyurethane foam produced as waste material in the production of foam mattress inserts may be employed.

By providing a deformable core in the composite spring of the invention, the spring is effectively reinforced and, in particular, if a resiliently deformable core is employed the overall resilience of the composite spring is augmented, rendering the spring particularly suitable for use in the edges of mattresses, divans and bed bases.

In a preferred embodiment of the invention the core is substantially cylindrical in its undeformed state, and may have a length substantially equal to the undeformed length of the spring.

The coil spring itself may have an hourglass or diabolo profile with opposite end coils of larger diameter than the central coil or coils of the spring. Alternatively the spring may have a cylindrical or barrel-shaped profile.

When a composite spring according to the invention is deformed under load, the deformation of the core produces a radially outward expansion of the core which in turn increases the deformation of the core by the coils of the spring so that, in effect, the deformed core material envelopes and protects at least the central coils of the spring, which is effectively reinforced by the core.

The invention will be further described, by way of example, with reference to the accompanying purely diagrammatic drawings, in which:

Figure 1 is a perspective view of a composite spring according to one embodiment of the invention;

Figure 2 is a longitudinal sectional view of the composite spring shown in Figure 1, and

Figure 3 is a side elevation of the composite spring shown in Figures 1 and 2, in a compressed or loaded condition.

The illustrated composite spring, indicated generally by reference numeral 1, consists of a coil spring 2 formed from steel wire enclosing a deformable core 3. The core 3 is in this embodiment of resiliently flexible plastics foam, for example polyurethane foam. The core 3 has a cylindrical shape in its undeformed state, and a length equal to the undeformed length of the coil spring 2.

The coil spring 2 has an hourglass or diabolo profile with opposite end coils 4, 5 of larger diameter than the central coil or coils of the spring 2, so that the spring 2 in its undeformed condition is waisted or constricted in its central region.

The deformable core 3 has a normal diameter in its undeformed state slightly less than the diameter of the end coils 4, 5. When inserted into the spring 2, the coils of the spring 2 come into contact with the periphery of the core 3, deforming the surface of the core, as illustrated in Figures 1 and 2.

When the composite spring 1 is subjected to a load in the axial direction, as for example when used as an internal spring of a mattress, divan or bed base, the axial distance between the coils of the spring 2 decreases, and at the same time the axial length of the core 3 is reduced. In consequence of this, the core 3 expands radially between the coils of the spring 2, as illustrated diagrammatically in Figure 3, increasing the deformation of the surface of the core 3 by the coils of the spring 2 until the coils, at least in the central region of the spring 2, are completely enveloped by the deformed core 3.

The effective resilience of the composite spring 1 is the result of the elastic deformation of both the spring 2 and the core 3. Furthermore, the core 3 serves to strengthen the spring 2 against lateral deformation, acting in effect as a support for the spring 2 in addition to its role as a supplementary resilient element.

Claims

1. A composite spring comprising a coil spring coaxially enclosing a deformable core, at least some of the coils of the spring being in contact with the periphery of the core and deforming the surface of the core.

2. A composite spring according to Claim 1, in which the core is substantially cylindrical in its undeformed state.

3. A composite spring according to Claim 1 or Claim 2, in which the core is substantially equal in length to the undeformed length of the spring.

4. A composite spring according to any one of Claims 1 to 3, in which the spring has an hourglass or diabolo profile with opposite end

coils of larger diameter than the central coil or coils of the spring.

5. A composite spring according to any one of Claims 1 to 4, in which the core comprises resilient foam material.

6. A composite spring substantially as herein described with reference to and as shown in the accompanying drawings.

New Claims or Amendments to Claims Filed on 29th Sept 1980
Superseded Claims

New or Amended Claims:—

7. A spring-interior mattress, divan or bed base incorporating a composite spring as claimed in any preceding claim.

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